

**National Aeronautics and Space Administration**

**Commercial Space Committee  
of the  
NASA Advisory Council**

**July 29, 2010  
NASA Headquarters  
Washington, DC**

**MEETING MINUTES**

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John Emond, Executive Secretary  
Commercial Space Committee

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Bretton Alexander, Chair  
Commercial Space Committee

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NASA Headquarters  
Washington, DC 20546  
July 29, 2010

**MEETING MINUTES  
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**Committee members present:**

- Bretton Alexander, Chair
- Bernard Harris
- Lon Levin
- Patti Grace Smith
- Wilbur Trafton
- John Emond, Executive Secretary

*Meeting Report prepared by  
David J. Frankel, Consultant*

### ***Opening Remarks***

Mr. John Emond, Executive Secretary of the Commercial Space Committee (CSC), opened the meeting. He announced that the meeting was a public meeting, subject to the Federal Advisory Committee Act regulations, and he summarized its requirements. He explained that the purpose of the meeting is to prepare findings and recommendations for the upcoming meeting of the NASA Advisory Council (NAC). Minutes for this meeting will be prepared and will be posted on NASA's Innovative Partnerships Program website.

Mr. Emond introduced Mr. Bretton Alexander, the Committee Chair.

Mr. Alexander thanked everyone for coming to the meeting. He described the process for bringing the Committee's results to the NAC and reviewed a chart explaining the differences between "Observations," "Findings," and "Recommendations." An Observation is something seen, discovered, witnessed, or learned during the course of fact-finding or public meetings. A Finding is an observation about which the Committee wishes to state an opinion. A Recommendation is a course of action being proposed by the Committee for NASA consideration and/or implementation in the future.

### ***Use of Space Act Agreements***

Mr. Alexander presented for the Committee's consideration a proposed Finding and Rationale on using Space Act Agreements for the Commercial Crew Transportation program.

Mr. Lon Levin cautioned the Committee that this subject matter could generate close scrutiny by lawyers. Mr. Alexander explained that presenting a Finding, rather than a Recommendation, would be less likely to generate legal opposition. Ms. Patti Smith expressed concern that funding for the program might be unbalanced and unduly burdensome on the private side. Mr. Alexander described how it can be difficult to use the Federal Acquisition Regulations (FAR) when paying for a program with combined funds from the government and the private sector.

After reviewing and discussing the proposed Finding and Rationale, the Committee made changes to the proposed language and, subject to editing during presentation to the NAC, approved the following the Recommendation and Rationale:

- ▶ **Finding:** The Council finds that the use of Space Act Agreements (SAAs) is appropriate for the proposed Commercial Crew Transportation program to develop and demonstrate commercial capabilities for the delivery of astronauts to and from the International Space Station. The use of Space Act Agreements is appropriate because the program is envisioned as a public-private partnership, in which both parties provide funding, to develop capabilities that will be owned and operated by the private sector to serve

**both government and private sector markets. In addition, SAAs allow flexibility in the development of transportation capabilities.**

- ▶ **Rationale: Other Transaction Authority (OTA) agreements, known as Space Act Agreements within NASA, are used by government agencies to provide funding toward the development of capabilities intended to be used for both government and private purposes, where government is not the sole funding source for the development activity. Currently, NASA is using SAAs on the Commercial Orbital Transportation Services (COTS) program in the same manner, funding two companies – SpaceX and Orbital – for development and demonstration of space systems for the transport of cargo to and from the International Space Station. For actual cargo delivery services, NASA has awarded Federal Acquisition Regulations (FAR) Part 12 commercial services contracts to both companies under the Commercial Resupply Services (CRS) program.**

**OTAs have been used successfully by other government agencies, including DARPA and the Department of Defense. A notable use of OTAs was on the Evolved Expendable Launch Vehicle (EELV) development program, in which the U.S. Air Force provided \$500 million to each of two companies for the development of the Atlas V and Delta IV expendable launch systems intended to serve both government and commercial customers. The companies – Boeing and Lockheed Martin – provided approximately \$4-5 billion in additional funding above that of the Air Force in order to develop and demonstrate the vehicles. For launch services, the Air Force contracted with both companies under FAR Part 12 for acquisition of commercial services.**

**A similar public-private partnership is appropriate for the development and demonstration of commercial human spaceflight capabilities because the systems are being designed to meet both NASA's need to transport astronauts to and from the International Space Station, as well as commercial purposes, including flights of astronauts, researchers, and other spaceflight participants to low Earth orbit and other in-space destinations, such as the planned Bigelow Aerospace habitats. Also, funding for the development of these capabilities will come from both NASA and the companies themselves, resulting in the use of public and private funds to meet public and private purposes.**

### ***Defining the NASA Market***

Mr. Alexander presented for the Committee's consideration a proposed Recommendation and Rationale for NASA to assess and define traffic requirements for crew transport to and from the International Space Station (ISS) and other Low Earth Orbit (LEO) destinations.

Mr. Alexander explained that this recommendation would require NASA to conduct a study on the requirements and to disseminate its results. He is concerned about receiving inconsistent answers from NASA personnel and believes it is important to ensure that the traffic requirements have been carefully considered. Ms. Smith stated it is essential to know the number of seats that will be required. In response to a question from Dr. Bernard Harris, Mr. Alexander explained that the recommendation does not have to address commercial cargo because those requirements have already been clarified. He added that the finding covers both the ISS and other LEO destinations. In response to a question from Mr. Trafton, Mr. Alexander explained that six-month periods for staying on the ISS are standard because that is the time that the Soyuz can remain in orbit. Mr. Emond noted that according to presentations given by NASA ISS program managers, family considerations are also taken into account given the length of time astronauts are away from their families. Mr. Trafton observed that a period less than six months would be helpful from a commercial perspective because it would mean more seats. The Committee discussed the potential impact from extending the life of the ISS.

After reviewing and discussing the proposed Finding and Rationale, the Committee made changes to the proposed language and, subject to editing during presentation to the NAC, approved the following the Recommendation and Rationale:

- ▶ **Recommendation:** The Council recommends that NASA assess and define the NASA traffic requirements for crew transport to and from the International Space Station (ISS) and other LEO destinations prior to issuing a draft solicitation for the Commercial Crew Transportation program. The number of flights and/or seats per year purchased by NASA on U.S. commercial spaceflight vehicles has a significant impact on the business plans of and availability of private investment for commercial providers. In assessing its requirements, NASA should consider how the availability of commercial space transportation capabilities could change the concept of operation of the ISS to get the most out of its infrastructure.
- ▶ **Rationale:** Understanding the expected NASA market for crew transport to and from the International Space Station has a significant impact on the business plans of and availability of private investment for commercial providers. Whether this number is large or small, clarity in what NASA intends to purchase is foundational for development of solid business plans upon which companies can seek private investment and financing. For example, under the Commercial Orbital Transportation Services (COTS) program, the clear definition of the requirement for cargo transport services provided a solid foundation for the business plans of the commercial bidders.

Currently, NASA is flying approximately 40 U.S. and international partner astronauts into space each year, with around 35 flying on five Shuttle flights and six on the Russian Soyuz. This maintains a year-round, on-orbit presence of three U.S. and international partner astronauts on the International Space Station, as well as “surges” of seven astronauts on the Shuttle docked to the

**Station for periods of 10-15 days. With the retirement of the Space Shuttle, NASA has contracted with the Russian Space Agency to purchase six seats per year to sustain three U.S. and international partner astronauts on the Station for six-month stays.**

**In order to provide greater clarity for potential commercial crew providers, NASA should assess the requirements for crew transport to and from the International Space Station for U.S. astronauts and those international partner astronauts for which NASA is obligated to provide transportation. NASA should take into account the following in its assessment:**

- **Extension of plans to fund U.S. participation in the International Space Station program from 2015 to “at least 2020.”**
- **Expected availability of multiple commercial crew transportation providers in the 2015 timeframe.**
- **Feasibility of permanent crew sizes higher than six.**
- **Crew rotation times other than the current six-month expeditions.**
- **The ability of non-NASA funded personnel to access and use the International Space Station, including other national governments, private researchers, and other spaceflight participants.**
- **Plans and funding for new capabilities and increased utilization of the International Space Station for research and technology demonstrations.**
- **The ability to “surge” for short durations to increase the number of astronauts on Station available for utilization and/or maintenance activities.**
- **Factors such as environmental control and life support system capacity, logistics/cargo resupply, and physical volume.**

### ***Business Case***

Mr. Alexander presented for the Committee's consideration a proposed Finding and Rationale for NASA to clarify the business case for commercial space transportation capabilities.

At Mr. Alexander's suggestion, the Finding was changed to a Recommendation. Mr. Levin observed that it is important to cover all markets here because NASA is shifting to a new model that includes NASA and non-NASA markets. Mr. Alexander explained that the Recommendation should not be limited to commercial crew and that the non-government market is expected to be small at the beginning. Mr. Levin explained that the purpose for the Recommendation is to have NASA enunciate its expectations for the markets, thereby establishing the business case, which then forms the basis for an acquisition strategy. Mr. Alexander expressed concern over market expectations that are inconsistent, both within NASA and external to NASA. The Committee discussed the extent to which private companies should be expected to disclose their business expectations. Mr. Levin asserted that private companies can provide a credible plan on a top-level. Mr. Alexander observed

that NASA has not enunciated its understanding of what a credible business plan should look like. Mr. Levin noted that a new business model is being developed and it is being called “commercial space.” He stated that factors other than commercial crew should be taken into consideration because commercial crew may be insufficient to sustain the market.

After reviewing and discussing the proposed Finding and Rationale, the Committee made changes to the proposed language and, subject to editing during presentation to the NAC, approved the following the Recommendation and Rationale:

- ▶ **Recommendation:** The Council recommends that NASA clarify and enunciate its expectations regarding the NASA and non-NASA markets for commercial space transportation capabilities, in particular commercial crew, and construct an acquisition strategy that is consistent with those business expectations. NASA currently has many internal views with different expectations of what the NASA and non-NASA markets are for commercial space transportation services, including crew, cargo, and traditional spacecraft launch. Going forward, NASA will require appropriate expertise to evaluate company business plans and monitor the development and provision of commercial space transportation services.
- ▶ **Rationale:** Successful implementation of NASA’s Commercial Crew Transportation program requires NASA to better understand the underlying business cases and markets for commercial crew. The Committee has received inconsistent information on NASA crew requirements and non-NASA human spaceflight markets. In addition, there is little analysis of the impact of non-human spaceflight markets, such as cargo and traditional spacecraft launch, on the ability of commercial providers to offer viable crew transportation services. Further analysis needs to be conducted on the cost, reliability, and safety implications of the overall commercial space transportation business, as well as the impact of domestic and foreign competition. This analysis will enable NASA to communicate its plans and programs internally and externally, as well as provide benchmarks upon which NASA and the public can evaluate the program.

**In order to achieve useful understanding, informed selection, and effective monitoring, NASA needs to expand its business expertise and experience.**

### ***FAA Licensing***

Mr. Alexander presented for the Committee's consideration a proposed Recommendation and Rationale for NASA to affirm that all launch activities under its Commercial Crew Transportation Program and follow-on crew transport services will be licensed by the Federal Aviation Administration (FAA) in accordance with the Commercial Space Launch Act (CSLA).

Mr. Alexander noted that there is a Justice Department opinion that there does not have to be FAA licensing if there is substantial NASA involvement. Ms. Smith discussed the opinion; she explained that the opinion was issued in 1990 and that the Committee might want to seek an updated opinion due to changes that have taken place. Mr. Alexander described the rationale for the proposed recommendation. In response to a question from Mr. Emond, he stated that commercial cargo is already required to be licensed by the FAA. There still is an issue, however, over whether NASA will indemnify against the loss of life. Ms. Smith observed that NASA, in the past, had no intent to be a customer; now, being a customer is the new concept. Mr. Levin expressed concern that third party indemnification should not be seen as the only benefit from requiring FAA Licensing. Mr. Alexander noted that requiring approval from two governmental regimes would inhibit the ability to obtain private equity funding. Mr. Levin explained that NASA flight certification would not be lost under the proposal. Ms. Smith expressed concern for preserving the spirit and intent of the CSLA.

After reviewing and discussing the proposed Finding and Rationale, the Committee made changes to the proposed language and, subject to editing during presentation to the NAC, approved the following the Recommendation and Rationale:

- ▶ **Recommendation:** The Council recommends that all launch activities under NASA's Commercial Crew Transportation Program and the resultant follow-on crew transport services be FAA licensed consistent with the Commercial Space Launch Act, as amended.
- ▶ **Rationale:** The goal of NASA's Commercial Crew Transportation Program is to both develop commercial capabilities to deliver NASA crews to the ISS and enable non-NASA human spaceflight capabilities and markets. Given this goal, a single regulatory regime is important during both the development and operation of commercial crew capabilities. FAA licensing of commercial crew activities conducted for NASA would provide a stable and predictable regulatory environment, enabling the opportunity for commercial spaceflight businesses to attract financing they may require in order to provide launch services to NASA.

FAA licensing and regulatory responsibilities for commercial crew activities conducted by commercial providers for NASA does not conflict, in any way, with NASA's ability to impose NASA human rating and safety requirements on commercial providers. For NASA crew missions, FAA licensing would be complementary with NASA flight certification. Further, FAA licensing affords benefits to NASA such as lower costs due to a streamlined regulatory environment for the service provider and third-party indemnification.

FAA licensing of commercial crew activities would be consistent with NASA's use of FAA licensing for commercial cargo delivery to the ISS. The Committee notes that launches of traditional spacecraft conducted by NASA's Launch



**Services Program (LSP) are not subject to FAA licensing. Commercial crew is different from LSP launches, however, because a single regulatory regime is important to achieve the goal to enable non-NASA human spaceflight capabilities and markets.**

### ***Concept of Operations and Acquisition Approach***

Mr. Alexander presented for the Committee's consideration a proposed Recommendation and Rationale for NASA to structure the crew transportation service acquisition and related ISS operations to take maximum advantage of commercial transportation capabilities. He explained that the intent is for NASA to build in flexibility so that bidders can structure offers that fit their business models and commercial capabilities.

After reviewing the proposed Finding and Rationale, the Committee made two minor editorial changes to the proposed language and, subject to editing during presentation to the NAC, approved the following Recommendation and Rationale:

- ▶ **Recommendation:** The Council recommends that NASA structure the crew transportation service acquisition approach and associated ISS concept of operations to take maximum advantage of the variety of potential commercial transportation capabilities. The Council recommends that future commercial crew transportation service solicitations simply specify the minimum and maximum number of seats to and from the ISS NASA would purchase in a given timeframe from each selected service contract provider. This approach will allow bidders flexibility to structure the offer that best fits the offerer's business model.
- ▶ **Rationale:** This approach follows one of the most innovative features of the ISS Commercial Resupply Services procurement in that it lets industry respond with capability based offers. Allowing commercial crew service providers to propose the concept of operations, the frequency of launch, and the number of crew to be transported on each launch that best fits their business model will result in a wider selection of choices for NASA to integrate to meet the total ISS need. This approach could result in more effective utilization of the ISS and will facilitate the long term goal of a sustainable and robust commercial LEO transportation industry that can support NASA's long term exploration enterprise.

### ***Adjournment***

Mr. Alexander thanked everyone for their participation. Mr. Emond adjourned the meeting.

## Appendix A

### Committee Membership

Bretton Alexander, Chair  
President, Commercial Spaceflight Federation

John Emond, Executive Secretary  
Collaboration Program Manager, NASA Innovative Partnership Program

Bernard Harris  
Former astronaut; CEO, Vesalius Ventures

Donald Hard  
Retired major general, U.S. Air Force

Lon Levin  
Founder, XM Satellite Radio

John Michael Lounge  
Former astronaut; former Boeing executive

Patti Grace Smith  
Former FAA Associate Administrator for Commercial Space Transportation

Wilbur Trafton  
Former NASA Associate Administrator for Space Flight

## Appendix B

### Meeting Attendees

#### *Committee Attendees:*

Alexander, Brett    Chairman  
Emond, John        Executive Secretary  
Harris, Bernard (telephonically)  
Levin, Lon  
Smith, Patti Grace  
Trafton, Wilbur

#### *NASA Attendees:*

Odle, Randy	NASA/JPL
Neu, Larry	NASA HQ/IG
Atkinson, Loretta	NASA HQ/IG
Marshall, Yolanda	NASA/JSC
Skidmore, Mike	NASA/ARC
Gender, Jane	NASA/ARC
Pittman, Bruce	NASA/ARC
Cibull, Sarah	NASA HQ/OSMA
Bradt, Jessica	NASA HQ/OSMA
Stigberg, Ellen	NASA HQ/ESMD
Miller, Charles	NASA HQ/OCT
Huntsman, Dave	NASA HQ/Commercial Crew
Irving, Rick	NASA HQ/OLIA

#### *Other Attendees:*

Morring, Frank	Aviation Week
Diekmann, Andreas	ESA
Eckert, Paul	Boeing
Fain, Evan	Avascent
Schowengerdt, Frank	SpacePartnerships.com
DeLuna, Alan	United Space Alliance

## Appendix C

### Presentation Material

- 1) Deliberations of the Commercial Space Committee